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EXAMINER	
UHLIR, NIKOLAS J	

ART UNIT	PAPER NUMBER
1773	

DATE MAILED: 06/07/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/808,427	OIKAWA ET AL.	
	Examiner	Art Unit	
	Nikolas J. Uhlir	1773	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *03/25/2004*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *24-31,37-42 and 44* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *24-31, 37-42, and 44* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date _____
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

DETAILED ACTION

1. This office action is in response to the amendment/arguments dated 3/25/04. Currently, claims 24-31, 37-42, and 44 are pending. Applicant's amendment/arguments have been fully considered but are not persuasive in overcoming the cited prior art.

Claim Rejections - 35 USC § 112

2. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

3. Claims 24-31, 37-42, and 44 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. In the instant claims, the applicant recites the phrase, "essentially consisting of." It is unclear to the examiner what this phrase means. Does "essentially consisting of" mean, "consisting of," or "consisting essentially of?" In patent law, "consisting of" and "consisting essentially of" have decidedly different meanings. For example, "consisting of X" means "X and nothing else." This is compared to "consisting essentially of X," which means something to the effect of "X, and anything else besides X that does not materially affect the properties imparted by X." Clarification is required.

4. **It is noted that for the purpose of this examination, the phrase "essentially consisting of" has been interpreted to mean, "consisting essentially of."**

Claim Rejections - 35 USC § 103

5. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

6. Claims 24-27, 29-31, and 41-42 are rejected under 35 U.S.C. 103(a) as being unpatentable over Honda et al. (US5851643)

7. Claim 24 requires a perpendicular magnetic medium comprising a non-magnetic substrate, a first underlayer on the non-magnetic substrate, essentially consisting of one of titanium alloy having a hexagonal close packed structure and a titanium compound; a second underlayer in contact with the first underlayer and essentially consisting of Ru; and a magnetic recording layer in contact with the second underlayer and containing Co.

8. Regarding these limitations, Honda teaches a magnetic recording medium that comprises a substrate, one or more underlayers on the substrate, and one or more magnetic layers on the underlayer(s) (figures 1a-e; column 8, lines 40-62; column 15, lines 57-67). In a particular embodiment, Honda teaches a medium comprising a substrate, a bcc underlayer on the substrate, an hcp underlayer on the bcc underlayer, and one or more magnetic layers on the hcp underlayer (column 8, lines 40-62). A media having this underlayer structure is taught to be a perpendicular recording medium (column 8, lines 46-47). Suitable materials for the BCC underlayer include at least one element selected from Cr, Mo, W, V, Nb, and Ta (column 8, line 65-column 9, line 3), as well as Cr based bcc alloys containing one or more selected from V, Ti, Ru, or Co (column 5, lines 1-5).

9. Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made to utilize a CrTi bcc alloy as the bcc underlayer taught by Honda, as Honda teaches the equivalence of CrTi to the other materials listed as suitable for use as the bcc underlayer.

10. The examiner considers the CrTi bcc underlayer to be equivalent to applicant's claimed first underlayer, as a CrTi alloy essentially consists of a Ti compound. With respect to applicants requirement of a 2nd underlayer essentially consisting of Ru, Honda teaches that suitable materials for the hcp underlayer (formed over the bcc underlayer) include at least one element selected from the group consisting of Ti, Zr, Hf, and Ru (column 8, lines 63-65).

11. Therefore it would have been obvious to one of ordinary skill in the art at the time the invention is made to utilize Ru as the hcp underlayer taught by Honda, as Honda teaches the equivalence of Ru to the other materials listed as suitable for use as the hcp underlayer.

12. The examiner considers the Ru hcp underlayer taught by Honda to be equivalent to applicant's claimed 2nd underlayer containing Ru. Regarding the requirement of a Co containing magnetic layer. Honda teaches that suitable materials for the magnetic recording layer(s) include cobalt based alloys (column 9, lines 1-15). Thus, all of the limitations of claim 24 are met.

13. Claim 25 requires the first underlayer to be an oxide, nitride, or carbide of titanium, a TiCr alloy, or elemental titanium. This limitation is met as set forth above for claim 24, as CrTi is a titanium chromium alloy.

14. Claim 26 further limits the group recited by claim 25 to a nitride of Ti, a TiCr alloy, or Ti. This limitation is met as set forth above for claim 25.

15. Claim 27 requires the magnetic layer to additionally comprise Cr and Pt. Honda in a specific example teaches that the magnetic layer(s) are suitable made of a CoCrPt alloy (column 17, lines 45-50). Thus, this limitation is met.

16. Claim 29 requires the magnetic layer to be a multilayer structure prepared by alternately forming a ferromagnetic layer containing Co and a non-magnetic layer containing one selected from Ru, PT, and Pd. Honda teaches embodiments wherein multiple Co based magnetic layers are formed with a non-magnetic layer present between adjacent magnetic layers (see figures 1a-c; column 5, lines 45-55). Suitable materials for the non-magnetic layer include Cr, Ru, Ti, V (column 5, lines 45-55), as well as Pt and Pd (column 17, lines 60-61).

17. Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made to utilize Ru as the non-magnetic layer between the adjacent Co based magnetic layers taught by Honda, as Honda recognizes the equivalence of Ru to the other materials listed as suitable for use as a non-magnetic layer between two adjacent Co based magnetic layers.

18. Claim 30 requires a soft magnetic layer between the substrate and the 1st underlayer. Honda teaches a specific embodiment wherein a soft magnetic layer is placed between the underlayer(s) and the substrate (column 23, lines 53-65). Thus, this limitation is met.

19. Claim 31 require the soft magnetic layer of claim 30 to be selected from one of the alloys listed. Honda teaches that suitable materials for the soft magnetic layer include Sendust (a known FeSiAl alloy) or amorphous soft magnetic materials 9column 23, lines 50-65).

20. Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made to utilize Sendust as the soft magnetic layer taught by Honda, as Honda teaches the equivalence of Sendust to the other materials listed as suitable for use as the soft magnetic layer.

21. Claim 41 requires the magnetic layer to have a single layer structure of a ferromagnetic layer containing Co. In a specific embodiment, Honda teaches that the magnetic layer can be a single layer (column 15, line 55-column 16, line 67; figure 1e)

22. Regarding claim 42, wherein the applicant requires the magnetic layer to have the same lattice constant and same concentration of added non-magnetic element. As set forth above, Honda teaches the use multiple magnetic recording layers having the same composition (and thus the same concentration of added non-magnetic elements) (column 15, lines 59-61 and figure 1b). Further, Honda teaches that though the lattice constant of the magnetic layers are preferably 1-5% different from one another (to induce stress between the layers), the same effect can be obtained with two magnetic layers having equal lattice constants through appropriate selection of the material for forming the intermediate layer (column 11, line 60-column 12, line 3).

23. Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made to utilize two magnetic layers having the same lattice constant

in the invention of Honda, as Honda teaches that the effects that are achieved by utilizing two magnetic layers having differing lattice constants can be replicated by two magnetic layers having the same lattice constant so long as the material for the intermediate layer is carefully chosen. Thus, Honda teaches the equivalence of magnetic layers having the same lattice constant to those having differing lattice constants.

24. Regarding the obviousness of using multiple magnetic layers having the same composition and lattice constant that are separated by a non-magnetic Ru layer. The examiner acknowledges that in some instances an Ru layer may have a lattice constant that is >5% different than lattice constant of the magnetic layer. The examiner further notes that Honda teaches that if the lattice constant difference between adjacent epitaxial grown layers is >5%, desirable epitaxial growth cannot be achieved (column 11, lines 60-65). However, Honda discloses that Ru can be used as the intermediate layer when it doesn't impact epitaxial growth (column 17, lines 54-60). Further, Honda teaches that the magnetic layers can be made of a Co alloy that includes known lattice expanding elements such as Pt, Ta, and Ru (column 17, lines 50-53). Thus, while Honda doesn't teach an explicit embodiment wherein two magnetic layers having the same composition are separated by a Ru intermediate layer, Honda does not teach away form the use of Ru. Further, based on the disclosure of Honda (namely that Ru can be utilized as an intermediate layer when it doesn't impact epitaxial growth), one of ordinary skill in the art would recognize Honda immediately envisioned an example where two magnetic layers having the same lattice constant are separated by a Ru

layer, wherein the lattice constant difference between the Ru layer and the magnetic layers is <5%. Thus, the examiner maintains that one of ordinary skill in the art would have been motivated to make the proposed modification with a reasonable expectation of success.

25. Claims 28, 37, and 43 are rejected under 35 U.S.C. 103(a) as being unpatentable over Honda as applied to claim 24 above, and further in view of Suzuki et al. (US6335103).

26. Honda et al. does not teach a magnetic recording medium that includes at least two magnetic layers, wherein the magnetic layers comprise Co, Pt and O, as required by claims 28 and 37.

27. It is noted that the structural limitations of claims 28 and 37 are met as set forth above by Honda, as Honda teaches a multiple magnetic layer structure separated by Ru intermediate layers, as discussed above at section 24. Further, the magnetic layers taught by Honda are suitably CoCrPt alloys, as discussed above. Further, as discussed above, Honda teaches that the multilayer magnetic layer can utilize magnetic layers having the same composition, as well as the same lattice constant.

28. Bearing this in mind, Suzuki et al. teaches that the noise of a magnetic layer can be reduced by incorporating 0.1-15% of oxygen into the magnetic layer (column 3, line 66-column 4, line 5).

29. Therefore it would have been obvious to one with ordinary skill in the art at the time the invention was made to incorporate oxygen as taught by Suzuki et al. into the magnetic layers taught by Futamoto et al. as modified by Honda et al.

30. One would have been motivated to make this modification due to the teaching in Suzuki et al. that media noise is reduced by incorporating oxygen into a magnetic layer, and because Futamoto et al. is concerned with obtaining a recording media that exhibits low noise. Thus, the limitations of claims 28 and 27 are met.

31. Regarding the requirement in claim 43 that the magnetic layers must contain the same amount of non-magnetic element. Given that Honda teaches that the magnetic layers can have the same composition, it would have been obvious to one of ordinary skill in the art at the time the invention was made to add the same amount of oxygen to each magnetic layer in the multiple identical magnetic layer structure taught by Honda.

32. Regarding the combination of Suzuki with Honda. The examiner acknowledges that Suzuki is drawn to a longitudinal medium whereas the embodiment of Honda relied upon by the examiner is a perpendicular medium. Although the ultimate end uses of Suzuki are different then that of Honda, one of ordinary skill in the art would have had a reasonable expectation of success in making the asserted combination, namely that it would have been obvious to incorporate oxygen into the magnetic layers of Honda. One of ordinary skill in the art would expect that incorporating oxygen into the magnetic layers of Honda would result in a reduction in the noise of these magnetic layers, as the reduction in noise is attributed by Suzuki to be a result of the thickening of grain boundaries and the corresponding reduction in magnetic interaction between grains (see Suzuki, column 4, lines 1-5). This phenomenon is independent of the end use of the magnetic layer, and would be expected to occur in a magnetic alloy regardless of that alloys magnetic orientation.

33. Claims 24-27; 29; 40, 42, and 44 rejected under 35 U.S.C. 103(a) as being unpatentable over Futamoto et al. (US6447936) in view of Honda.

34. Regarding claim 24, Futamoto '936 teaches a magnetic recording medium comprising a substrate, a first underlayer 12 on the substrate, a second underlayer 23 on the first underlayer, a first perpendicular recording layer 13 on the second underlayer, and a second perpendicular recording layer on the first perpendicular recording layer (figure 2 and column 5, lines 48-63). In a specific embodiment, the first underlayer is a TiCr alloy containing 10 atomic % Cr (column 11, lines 25-40). The second underlayer is suitably a non-magnetic or weakly magnetic hcp alloy (column 5, lines 45-62). The magnetic layer 13 is suitably a Co based alloy (column 4, lines 59-65).

35. Futamoto '936 fails to teach a second underlayer containing Ru, as required by claim 24.

36. However, Honda teaches the use of a structural control layer between a first magnetic layer and a first underlayer (column 8, lines 40-62). Suitable materials for forming the structural control underlayer include hcp materials, such as Ta, Ta, Ru, Co, or an hcp alloy of one of these elements and Cr, V, or W (column 6, lines 44-51)

37. Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made to utilize Ru as taught by Honda as the non-magnetic or weakly magnetic hcp alloy 2nd underlayer taught by Futamoto '936, as Honda teaches the equivalence of Ru to CoCr alloys as being suitable for use as a non-magnetic hcp second underlayer between a first underlayer and a magnetic layer.

38. The applicant is respectfully reminded that substitution of equivalents requires no express motivation as long as the prior art recognizes the equivalency. *In Re Fount* 213 USPQ 532 (CCPA 1982).

39. Regarding claims 25-26, these limitations are met as set forth above for claim 24.

40. Regarding claim 27, Futamoto '936 teaches that CoCrPt alloys are suitable for use as the first magnetic layer (column 11, table 1). Thus, the limitations of claim 27 are met.

41. Regarding claim 29, wherein the applicant requires the magnetic layer to have a multilayer structure wherein at least one ferromagnetic layer containing Co is formed with a non-magnetic layer containing one of Ru, Pt, or Pd. Futamoto '936 in certain embodiments teaches that the second magnetic layer is formed by alternately laminating Pt with Co or Pd with Co (column 7, line 2). The examiner notes that this disclosure implies that the Pd or Pt layers of the second magnetic layer are deposited onto the first magnetic layer before the Co layers. Thus, the resulting structure meets the language of claim 29.

42. Regarding claim 40, this limitation is met as set forth above for claim 24.

43. Regarding claim 42, wherein the applicant requires the magnetic layer to comprise at least two ferromagnetic layers, wherein the layers have the same lattice constant and the same total concentration of an added non-magnetic element. This limitation is met as set forth above for claim 29. The second magnetic layer of Futamoto '936 comprises alternating layers of ferromagnetic Co and non-magnetic Pt. As the layers of Co and Pt are stacked, so long as there are at least 3 Co layers in the stack

(i.e. Co/Pt/Co/Pt/Co) at least two of the layers will be formed on the same substrate (pt) and have the same content of added non-magnetic elements (0%). The second magnetic layers of Futamoto '936 is preferably formed to a thickness of 3-10nm, and in specific embodiments alternating 1.5nm Co/1.5nmPt films form this layer. Thus, with a 10nm film, a Co/Pt/Co/Pt/Co/Pt/Co structure is formed. As at least two of these films have the same composition, are formed on the same substrate, to the same thickness, and via the same method, the examiner takes the position that at least two of the magnetic layers in this multilayer stack will have the same lattice constant.

44. Regarding claim 44, this limitation is met as set forth above for claim 29.

Response to Arguments

45. Applicant's arguments filed 3/25/2004 have been fully considered but they are not persuasive.

46. First, the applicant argues that the instant claims, as amended, require the first underlayer to have a HCP structure. The examiner respectfully disagrees. The pertinent portion of claim 24 reads: "essentially consisting of one of titanium alloy having a hexagonal close packed structure and a titanium compound." Thus, claim 24 requires *either* a titanium alloy having an hcp structure *or* a titanium compound. Thus, the instant claims are clearly not limited to hcp titanium alloys. Rather, claim 24 merely requires a titanium compound, which could have any known crystal structure or could be amorphous. As applicant's argument is not commensurate in scope with the instant claims, it is not persuasive.

47. Next, applicant argues that the examples represented by figures 1b-1e (which show a non-magnetic film between multiple magnetic layers) of Honda are comparative structures and thus are not the structures according to the invention of Honda. This assertion is incorrect. Applicant is directed to column 15, line 39-56 of Honda. In particular, applicant is directed to the portion of the cited passage wherein Honda states, "for the purpose of comparison, we fabricated several different versions of *our inventive magnetic film*" (emphasis added) (column 15, lines 38-39). This statement clearly establishes that the samples shown by figures 1b-1e are various embodiments of the invention of Honda. The fact that Honda compares the samples to one another and that one sample has better or worse properties then a different sample does not detract from the fact that each sample is disclosed as a separate embodiment of the invention. The examiner strongly disagrees with applicant's assertion that the embodiments shown in figures 1b-1e are not part of the invention of Honda. In fact, the specific language utilized by Honda, i.e. "we fabricated several different versions of our invention" explicitly states the opposite of what applicant is arguing. Accordingly, this argument is not persuasive.

48. The applicant also argued against the combination of Honda with Suzuki. Specifically, applicant argues that one of ordinary skill in the art would not be motivated to utilize a Ru layer between two identical magnetic layers. The applicant supports this argument by pointing out that Honda requires adjacent epitaxially grown layers to have a lattice constant difference less than 5%, and that Ru has a lattice constant that is >5% different than that of a CoCrPt magnetic layer containing as much as 20 atomic % Pt.

49. This argument is not persuasive in view of the explicit teachings of Honda. Specifically, Honda teaches that the magnetic layers can have the same composition and lattice constant, and can be made of a Co alloy that includes known lattice expanding elements such as Pt, Ta, and Ru (column 17, lines 50-53). Further, Honda teaches that Ru can be used as the intermediate layer when it doesn't interfere with epitaxial growth. Thus, while Honda doesn't teach an explicit embodiment wherein two magnetic layers having the same composition are separated by a Ru intermediate layer, Honda does not teach away from the use of a Ru intermediate layer. Based on these disclosures, one of ordinary skill in the art would recognize Honda immediately envisioned an example where two magnetic layers having the same lattice constant are separated by a Ru layer, wherein the lattice constant difference between the Ru layer and the magnetic layers is <5%. Thus, the examiner maintains that one of ordinary skill in the art would have been motivated to make the proposed modification with a reasonable expectation of success.

50. Applicant's arguments with respect to Suzuki are addressed in the office action at section 32.

51. The applicant also argues against the combination of the Futamoto references. Specifically, applicant argues that Futamoto '893 discloses the use of an hcp second underlayer that "essentially consists of Co," not Ru. While the examiner disagrees with the applicant's apparent interpretation of "essentially consisting of Ru" as meaning an alloy containing at least 50% Ru, the examiner agrees that the $CoRu_{45}$ underlayer of Futamoto '893 does not read on an underlayer that "consists essentially of Ru."

However, the new rejection of the claims as obvious over Futamoto '936 in view of Honda obviates all of the applicant's arguments as to this point.

52. The applicant further argues that the Futamoto '936 does not teach the structure claimed by claims 29 and 42. Specifically, applicant argues that Futamoto '936 requires a CoCrPtTa first magnetic layer between the multilayer Co/Pt or Co/Pd second magnetic layer, whereas the instant claims require the multilayer magnetic layer to be in contact with the second underlayer. The examiner notes that claims 29 and 42 mere require alternating magnetic layers containing Co and non-magnetic layers of Pt, Pd, or Ru. The examiner clarified the rejection to point out that Futamoto teaches embodiments wherein multiple alternating layers of Pt/Co or Pd/Co are formed on top of the Co based first magnetic layer. When the first layer of the second magnetic layer is Pt or Pd, the claim limitations are met, as the resulting medium will have the following structure:

substrate/1st underlayer/2nd underlayer/Co alloy 1st magnetic/pt or pd/Co/pt or pd/Co

53. Finally, applicant clarifies their prior arguments with respect to the lattice constant difference between Ru and a CoCrPt based alloy. While the examiner acknowledges these arguments, the magnetic layers of Honda are not limited to CoCrPt based alloys, and can contain other lattice enlarging elements, such as Ru or Ta. Honda teaches that the magnetic layers can be the same composition and can have the same lattice constant. Honda also teaches that Ru is a suitable intermediate layer material when it does not impact epitaxial growth (when the lattice constant between the Ru intermediate layer and the upper magnetic layer is <5% different). Given these teachings, the

examiner maintains that one of ordinary skill in the art at the time the invention was made would have been motivated with a reasonable expectation of success to utilize two magnetic layers separated by a non-magnetic Ru intermediate layer, wherein the magnetic layers have the same lattice constant, and the lattice constant difference between the intermediate layer and the magnetic layers is <5%.

Conclusion

54. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Nikolas J. Uhlir whose telephone number is 571-272-1517. The examiner can normally be reached on Mon-Fri 7:30 am - 5 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Paul J. Thibodeau can be reached on 571-272-1516. The fax phone

number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

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